

REMARKS

In the March 5, 2009 Office Action, the examiner requested restriction to one of the following two groups: Group I.: Claims 1-12, drawn to a method; and Group II.: Claims 13-26, drawn to a product. Applicant elected Group II without traverse, the product claims.

The examiner stated that if claims directed to the product are elected, and the product claims are subsequently found allowable, withdrawn process claims that depend from, or otherwise require all the limitations of the allowable product claims, will be considered for rejoinder. In the event of rejoinder, the requirement for restriction between the product claims and the rejoined process claims will be withdrawn, and the rejoined process claims will be fully examined for patentability. See March 5, 2009 Office Action paragraph 6 on pages 3 and 4.

Claims 13-26 are currently being considered.

Rejection under 35 U.S.C. §103(a)

On pages 3-6 of the Office Action, the examiner rejects Claims 13-26 as being unpatentably obvious over US 6,975,063 (hereinafter “*Mao*”) and US 7,504,383 (hereinafter “*Gazit*”) in view of US 2007/0276131 (hereinafter “*Ferré*”) and Lee et al., “Micromanipulation of magnetotactic bacteria with a microelectromagnet matrix” <http://arxiv.org/abs/cond-mat/0402204> (hereinafter “*Lee*”).

Claim 13 is the only pending independent claim. Claim 13 recites a “magnetic nanotube” which comprises “a plurality of bacterial magnetic nanocrystals” and “a nanotube...[which is] able to absorb the bacterial magnetic nanocrystals; wherein the plurality of the bacterial magnetic nanocrystals are contacted on at least one of the interior and exterior surface of the nanotube.”

The examiner states that *Mao* describes a process for the metallization of carbon nanotubes. In particular, the examiner refers to an embodiment in which magnetite is deposited on carbon nanotubes. (See the paragraph bridging pages 3 and 4 of the Office Action.)

Gazit is cited by the examiner for describing peptide nanotubes which are used to encapsulate materials including magnetite. (See page 4, paragraph 12 of the Office Action.)

The examiner concedes that neither *Mao* nor *Gazit* teach that “the source of magnetite is derived from bacterial magnetic nanocrystals synthesized from bacteria selected from the genus *Magnetospirillum*.” (See page 5, 2nd paragraph, of the Office Action.)

The examiner states that *Ferré* teaches the assembly of macromolecular substances including “proteins, carbohydrates, nucleic acids, nucleic acid analogues, protein-nucleic acid chimera, and nanomaterials...” The examiner points to paragraph [0075] of *Ferré* for teaching that “methods for preparation of magnetic particles are described in the art and the person skilled in the art will be able to select and test appropriate combinations of coating, activation and coupling chemistries.” The examiner refers to paragraph [0076] for the teaching that magnetotactic bacteria, i.e., *Magnetospirillum*, “expressing suitable surface exposed ligands, could be used as [a] capturing agent...” (See Office Action beginning at page 5, 3rd paragraph, to page 6, 1st paragraph.)

The examiner cites *Lee* for teaching “the assembly of magnetic nanoparticles by micromanipulation of magnetotactic bacteria,” including “*Magnetospirillum magnetotacticum* as a source for Fe₃O₄.” (See page 6, 2nd paragraph, of the Office Action.)

The examiner concludes that the present invention is unpatentably obvious because a skilled artisan “would have been motivated to substitute the magnetite used to modify the nanostructures of *Mao* and *Gazit* with the functionally equivalent magnetite produced from the magnetotactic bacteria described in *Ferré* and *Lee* since the magnetite described in the references are described as structurally equivalent to that disclosed in *Mao* and *Gazit*.” (See page 6, penultimate paragraph, of the Office Action.)

In order to expedite prosecution, Claim 13 has been amended to include the following phrase: “...wherein the nanotube is a peptide bolaamphiphile nanotube...” Support for this language is in paragraph [0036] of the application.

In order for a prima facie obviousness rejection to be made, all the claim limitations must be found in the cited prior art. None of the references teach a peptide bolaamphiphile nanotube. *Mao* only teaches carbon nanotubes. *Gazit*, in fact, seems to teach away from peptide bolaamphiphile nanotubes. In particular, at col. 14, lines 56-60, *Gazit* states:

[P]eptide nanotubes such as those composed of surfactant like peptides and cyclic D-, L-peptide subunits form crystals, networks, or bundles of nanostructures and thus can **not** be used in the above-described applications. (Emphasis added.)

(It should be noted that bolaamphiphiles are also known as bolaform surfactants.)

Ferré and *Lee* do not remedy the deficiencies in the primary references of *Mao* and *Gazit*. In fact, *Ferré* does not even mention peptides in the listing of substances which can be macromolecularly assembled. Finally, *Lee* simply discloses a microelectromagnet matrix to assemble magnetic particles suspended in a fluid.

Accordingly, applicants respectfully request that the obviousness rejection be withdrawn.

First Rejection under 35 U.S.C. §112

The examiner has rejected Claims 14 and 17 as being indefinite. In particular, the examiner rejects the claims for the term “substantially.” (Office Action page 2, paragraph 5.)

In Claim 14, the term is used as follows: “wherein the plurality of bacterial magnetic nanocrystals is *substantially* aligned to form a linear chain on the interior surface of the nanotube.” (Note Claim 14 is presently amended to replace “are” with “is.”) In Claim 17, the term is used as follows: “wherein each of the plurality of bacterial magnetic nanocrystals is *substantially* spherical and has an average diameter *substantially* in a range of about 50 to about 100 nanometers.”

A skilled artisan would understand what the term “substantially” means in the respective contexts. That is, the term would not be indefinite to a skilled artisan. Applicants also note that the Court of Appeals for the Federal Circuit (CAFC) recently held that the term “substantially” is permissible (*Verve, LLC v. Crane Cams, Inc.*, 311 F.3d 1116 (Fed. Cir. 2002)). In particular, the CAFC stated that determination of the meaning of the term “substantially” is that as would be understood by persons in the field of the invention.

Additionally, the CAFC indicated:

Expressions such as “substantially” are used in patent documents when warranted by the nature of the invention, in order to accommodate the minor variations that may be appropriate to secure the invention. Such usage may well satisfy the charge to “particularly point out and distinctly claim” the invention, 35 U.S.C. §112, and indeed may be necessary in order to provide the inventor with benefit of his invention. (*Verve, LLC v. Crane Cams, Inc.*, 311 F.3d at 1120. (Emphasis added.))

Thus, applicants respectfully request that the rejection be withdrawn.

Second Rejection under 35 U.S.C. §112

The examiner rejects Claims 19, 21, 22, 24 and 26 for being indefinite for the phrase “adapted for use.” (Office Action page 2, paragraph 6.)

The claims have been amended so that the phrase “adapted for use” has been replaced by “used.” Accordingly, the rejections have been obviated. Applicants have also amended Claim 25 to replace the phrase.

Third Rejection under 35 U.S.C. §112

The examiner rejected Claim 15 as being indefinite for lack of antecedent basis since “particles” is recited instead of “nanocrystals” in line 3. (Office Action page 2, paragraph 7.) Claim 15 has been amended to remedy such informality.

It is believed that this application is in condition for allowance. If resolution of any remaining issues is required prior to allowance of the application, it is respectfully requested that the Examiner contact Applicants’ undersigned attorney at the telephone number provided below.

Respectfully submitted,

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